

## REMARKS/ARGUMENTS

In the Office Action mailed December 18, 2009, claims 1-20 were rejected. In response, Applicants hereby request reconsideration of the application in view of the amendments and the below-provided remarks. Claims 1, 8 and 15 are amended. No claims are added or canceled. No new matter has been added.

### Claim Rejections under 35 U.S.C. 103

Claims 1-2, 5, 8-9, and 12 were rejected under 35 U.S.C. 103(a) as being unpatentable over Imai (U.S. Pat. No. 5,506,427) in view of Herbert et al. (U.S. Pat. No. 5,773,350, hereinafter Herbert). Additionally, claims 3 and 10 were rejected under 35 U.S.C. 103(a) as being unpatentable over Imai and Herbert, and further in view of Koshimizu et al. (U.S. Pat. Pub. No. 2005/0181569 A1, hereinafter Koshimizu). Additionally, claims 4 and 11 were rejected under 35 U.S.C. 103(a) as being unpatentable over Imai and Herbert, and further in view of Schiz et al. (Leakage Current Mechanisms in SiGe HBTs Fabricated Using Selective and Nonselective Epitaxy, IEEE Transactions on Electron Devices, Vol. 48, No. 11, November 2001, hereinafter Schiz). Additionally, claims 15 and 17 were rejected under 35 U.S.C. 103(a) as being unpatentable over Imai in view of Schiz. Additionally, claims 6 and 13 were rejected under 35 U.S.C. 103(a) as being unpatentable over Imai and Herbert, and further in view of Verma et al. (U.S. Pat. Pub. No. 2005/0079678 A1, hereinafter Verma). Additionally, claims 7 and 14 were rejected under 35 U.S.C. 103(a) as being unpatentable over Imai and Herbert, and further in view of Frei et al. (U.S. Pat. No. 6,509,242 B2, hereinafter Frei). Additionally, claim 16 was rejected under 35 U.S.C. 103(a) as being unpatentable over Imai and Schiz, and further in view of Koshimizu. Additionally, claim 18 was rejected under 35 U.S.C. 103(a) as being unpatentable over Imai and Schiz, and further in view of Verma. Additionally, claim 19 was rejected under 35 U.S.C. 103(a) as being unpatentable over Imai and Schiz, and further in view of Frei. Additionally, claim 20 was rejected under 35 U.S.C. 103(a) as being unpatentable over Imai and Schiz, and further in view of Asai et al. (U.S. Pat. No. 6,455,364 B1, hereinafter Asai). However, Applicants respectfully

submit that these claims are patentable over Imai, Herbert, Koshimizu, Schiz, Verma, Frei, and Asai for the reasons provided below.

### Independent Claim 1

Claim 1 has been amended to particularly point out the steps of forming an amorphous or polysilicon layer over the silicon oxide side walls and forming a second mono-crystalline layer over the first mono-crystalline layer. Support for this amendment can be found in Applicants' specification at, for example paragraphs [0019] and [0026] and is illustrated in Fig. 2 (U.S. Pat. Pub. No. 2009/0075447 A1).

As amended, claim 1 recites:

“A method for growing a mono-crystalline emitter for a bipolar transistor, comprising:  
providing a trench formed on a silicon substrate having opposed silicon oxide side walls;  
selectively growing a highly doped first mono-crystalline layer on the silicon substrate in the trench;  
forming an amorphous or polysilicon layer over the silicon oxide side walls; and  
forming a second mono-crystalline layer over the first mono-crystalline layer;  
wherein the amorphous or polysilicon layer and the second mono-crystalline layer are formed by non-selectively growing a second silicon layer over the trench”  
(emphasis added).

In contrast, Imai and Herbert do not teach forming a second mono-crystalline layer over the first mono-crystalline layer by non-selectively growing a second silicon layer over the trench. Rather Imai teaches that an emitter electrode of  $n^+$ -type polysilicon is formed on the  $n^+$ -type emitter (Imai, col. 4, lines 16-17. Emphasis added). However, the electrode as taught by Imai is a polysilicon layer not a mono-crystalline layer as recited in amended claim 1. Furthermore, Herbert also fails to teach forming a second mono-crystalline layer over the first mono-crystalline layer by non-selectively growing a second silicon layer over the trench. Herbert merely teaches that a crystalline silicon emitter region 32 (see Herbert, Fig. 1G) is grown and a polysilicon layer is deposited and then masked and etched to define a polysilicon region 34 (Herbert, col. 3, lines 46-51. Emphasis added). However, region 34 of Herbert is a polysilicon layer and not a mono-crystalline layer.

For the reasons presented above, Imai and Herbert, alone or in combination, do not teach all of the limitations of the amended claim 1 because Imai and Herbert do not

teach forming a second mono-crystalline layer over the first mono-crystalline layer by non-selectively growing a second silicon layer over the trench, as recited in amended claim 1. Accordingly, Applicants respectfully assert that amended claim 1 is patentable over Imai and Herbert, because Imai and Herbert do not teach all of the limitations of amended claim 1.

#### Independent Claims 8 and 15

Independent claims 8 and 15 have been amended to include similar limitations to amended claim 1. Although the language of claims 8 and 15 differs from the language of claim 1 and the scope of claims 8 and 15 should be interpreted independently of claim 1, Applicants respectfully assert that the remarks provided above in regard to claim 1 apply also to claims 8 and 15.

#### Dependent Claims 2-7, 9-14, and 16-20

Claims 2-7 are dependent on claim 1, claims 9-14 are dependent on claim 8, and claims 16-20 are dependent on claim 15. Applicants respectfully assert that claims 2-7, 9-14, and 16-20 are allowable based on allowable base claims. Additionally, each of claims 2-7, 9-14, and 16-20 may be allowable for further reasons.

## CONCLUSION

Applicants respectfully request reconsideration of the claims in view of the amendments and the remarks made herein. A notice of allowance is earnestly solicited.

At any time during the pendency of this application, please charge any fees required or credit any over payment to Deposit Account **50-3444** pursuant to 37 C.F.R. 1.25. Additionally, please charge any fees to Deposit Account **50-3444** under 37 C.F.R. 1.16, 1.17, 1.19, 1.20 and 1.21.

Respectfully submitted,

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